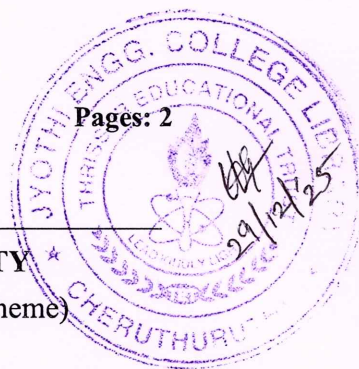


Reg No.: \_\_\_\_\_

Name: \_\_\_\_\_

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

B.Tech Degree S1 (R,S) Examination December 2025 (2024 Scheme)

**Course Code: GZPHT121****Course Name: PHYSICS FOR PHYSICAL SCIENCE / LIFE SCIENCE**

Max. Marks: 60

Duration: 2 hours 30 minutes

**PART A***(Answer all questions. Each question carries 3 marks)*

		CO	Marks
1	What are the characteristics of Laser?	1	(3)
2	Write any six advantages of fiber optic communication system over the conventional wire transmission system.	1	(3)
3	What are the conditions that should be satisfied to obtain sustained interference fringes?	2	(3)
4	Define resolving power and dispersive power of a grating.	2	(3)
5	Explain the probability interpretation of wavefunction. Write the normalization condition.	3	(3)
6	Explain the phenomenon of quantum mechanical tunneling with any two examples.	3	(3)
7	List two differences between longitudinal and transverse waves. Give an example for each.	4	(3)
8	What is SONAR?	4	(3)

**PART B***(Answer any one full question from each module, each full question carries 9 marks)***Module -1**

9	a) Explain the construction and working of CO <sub>2</sub> laser.	1	7
	b) Define Metastable state	1	2
10	a) Define numerical aperture of an optical fibre. With a neat diagram derive an expression for numerical aperture of a step index fibre.	1	6
	b) Calculate Numerical aperture of a fiber having core refractive index 1.52 and cladding refractive index 1.41.	1	3

**Module -2**

- |    |    |   |   |   |
|----|----|---|---|---|
| 11 | a) | Explain the experimental setup of air wedge with neat diagram, derive the expression for band width of interference pattern formed by air wedge.  | 2 | 6 |
|    | b) | Light of wavelength 6000 Å falls normally on a thin wedge-shaped film of refractive index 1.4 forming fringes that are 2 mm apart. Find the angle of the wedge in radians?                          | 2 | 3 |
| 12 | a) | Define Grating element and derive the expression for Grating equation with diagram.   | 2 | 6 |
|    | b) | A parallel beam of monochromatic light is allowed to incident normally on a grating having 4250 lines/cm and the second order maximum is formed at 30°. Calculate the wavelength of the light used. | 2 | 3 |

**Module -3**

- |    |    |  |   |   |
|----|----|--|---|---|
| 13 | a) | Derive time dependent Schrodinger wave equation.   | 3 | 6 |
|    | b) | Find the de-Broglie wavelength of neutron of energy 15 MeV. Given mass of the neutron $1.675 \times 10^{-27}$ kg and $h = 6.625 \times 10^{-34}$ Js. | 3 | 3 |
| 14 | a) | State Heisenberg's uncertainty relations and explain absence of electron in the nucleus.   | 3 | 6 |
|    | b) | The life time of an excited state is $10^{-8}$ s. Determine uncertainty in the frequency of light emitted by an atom.                                | 3 | 3 |

**Module -4**

- |    |    |   |   |   |
|----|----|---|---|---|
| 15 | a) | Derive the expression for fundamental frequency of transverse vibrations in a stretched string.   | 4 | 6 |
|    | b) | State three laws of transverse vibrations in a stretched string.  | 4 | 3 |
| 16 | a) | Explain any three factors affecting acoustics of a building and give their remedies.  | 4 | 6 |
|    | b) | An auditorium has a volume of 10000 m <sup>3</sup> and is designed to have a reverberation time of 1.4 second. What should be the total absorption in the auditorium? | 4 | 3 |

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